

Davidson. Examination of the British Museum register reveals a missing Davidson specimen from Maharashtra in 1884.

The Forest Owlet has always been considered virtually identical to Spotted Owlet *Athene brama*, but evaluation shows that it strongly differs in having a faintly spotted crown and back, pale auriculars with no white rear border, a broad complete dark frontal collar, breast almost solid brown, boldly barred flanks, an unmarked white lower breast and belly, and prominently banded wings and tail (structurally it may merit Hume's monotypic genus *Heteroglaux*). These features, combined with greater clarity over records following the elimination of Gujarat, led to the bird's rediscovery in 1997 by Dr Rasmussen with B. F. King and D. F. Abbot. It is, however, in serious danger from deforestation.

The eight hundred and seventy ninth meeting of the Club was held on Tuesday, 13 October 1998 at 6.15 p.m. 16 Members and 10 Guests attended.

Members present were: The Revd T. W. GLADWIN (*Chairman*), Miss H. BAKER, P. J. BELMAN, P. J. BULL, Cdr M. B. CASEMENT RN, Professor R. J. CHANDLER, Professor R. A. CHEKE, J. A. JOBLING, R. H. KETTLE, Dr C. F. MANN, D. J. MONTIER, R. G. MORGAN, Dr R. P. PRŶS-JONES, R. E. SCOTT, Dr R. C. SELF and N. H. F. STONE.

Guests attending were: Mrs J. C. BULL, Mrs C. R. CASEMENT, J. H. W. CHITTY, Mrs D. CHITTY, Mrs J. M. GLADWIN, Dr B. HATCHWELL (*Speaker*), Ms C. HOFF, Mrs M. MONTIER, J. SCHARLEMANN and F. STEINHEIMER.

Dr Ben Hatchwell subsequently gave a highly interesting presentation, illustrated with slides, entitled "*The Cooperative behaviour of Long-tailed Tits*".

The Long-tailed Tit *Aegithalos caudatus* is one of about 300 bird species known to breed cooperatively—some individuals forego personal reproduction and instead help to rear offspring which are not their own. Such behaviour poses a problem for evolutionary biologists because animals are expected to act in their own selfish interests rather than in the interests of others. What are the benefits of cooperation and why has it evolved in Long-tailed Tits?

Long-tailed Tits spend most of the year (June–February) in flocks of 10–15 birds, typically comprising a family of 8–10 juveniles, their parents and a variable number of helpers. Flocks split up in early spring, males adopting part of the flock range, while females either pair up within the flock, or disperse to neighbouring flock ranges. All birds start the season breeding in pairs, but 80% of nests fail due to predation, mostly by corvids. Pairs who fail have two options: (i) they may re-nest if failure occurs early in the season, or (ii) if they fail after early May, they may become helpers at another pair's nest, assisting them by feeding their nestlings. About 50% of nests have at least one helper (maximum 4) for part of the nestling period. DNA fingerprinting and genealogical data indicate that helpers assist close relatives.

Helpers benefit in two ways from their cooperation. First, by assisting relatives they gain indirect fitness benefits by increasing the production of related offspring. The presence of two or more helpers increases the amount of food given to nestlings, so each fledgling is heavier and has a higher probability of surviving to breed. Secondly, by helping, failed breeders might increase their own chance of reproducing in the following season (a direct fitness benefit) because helpers tend to have a better chance of surviving to the next season (65%) than do failed breeders who do not help (45%).

Given these potential benefits, why has cooperative behaviour evolved so rarely? Do cooperative species differ ecologically from non-cooperative species? The Ecological Constraints Hypothesis attributes cooperation to constraints (e.g. a lack of vacant territories or breeding partners) which restrict dispersal, forcing grown offspring to 'stay at home' and help their parents, even though they would prefer to breed independently. Long-tailed Tits do not fit easily into this hypothesis because analysis of BTO ringing data shows that their natal dispersal does not differ from ecologically similar non-cooperative species. Furthermore, all birds are able to breed independently. Nevertheless, one can speculate on those aspects of Long-tailed Tit biology that might promote cooperation. First, dispersal occurs unusually late (eight months after fledging), giving family members ample opportunity to learn who their relatives are, enabling them preferentially to assist kin following breeding failure. Second, late dispersal may result from their small size which makes flock membership critical for winter survival. Failed breeders who cooperate might 'buy' access to the communal roosts which are characteristic of this species.

Such species-specific explanations are unsatisfactory because they obviously do not apply to all cooperative breeders. However, they do serve to identify factors (e.g. the benefits of group living) which are likely to be of general significance in explaining this unusual behaviour.

The B.O.C. Archive

The British Ornithologists' Club has been in existence now for over a hundred years, during which time it has not had a permanent home. A few years ago a tin box was returned to the Secretary from the London Zoological Society where it had been stored. This contained the minute books and attendance records from the earliest time (less one attendance 'lost on the Underground'!).

It was thought an ideal time to think of the future of this material plus that of the correspondence etc. that had accrued over the years from various Chairmen and Secretaries. Mr Ronald Peal and Mrs Amberley Moore were instrumental in passing material to me as well as giving good advice, as did Dr James Monk.

The archive consists, in addition, of the Herbert Stevens Archive, historical material brought together when a history of the Club was considered (this includes an audio tape), a bound set of the Bulletin and copies of the Club's publications. A recent addition, provided by Mr David Griffin, is a list of speakers and subjects compiled from the Bulletin.

The committee decided that the material available should be catalogued and organised as an official archive and I was asked to do this. The Secretaries' and Chairmen's correspondence is very limited in content; some people in the past kept every scrap of paper, others threw them out after dealing with them. The material that was kept does show the amount of work that these two posts involved, although the ability to make mountains out of molehills was very obvious. However it is a pity that material by such stalwarts as Lord Rothschild, R. Bowdler-Sharpe and W. L. Sclater were not kept. It is also possible that we might have had some gems by the Rev. Jourdain and N. F. Ticehurst.

Some aspects of the Archive are of course ongoing, and this has meant that the index is in several parts to accommodate new material where necessary. The archive is at present housed at the Natural History Museum (Tring), thanks to the generosity of the museum and staff. Access is restricted, and applications to consult the archive need to be approved by the Chairman and Archivist; the latter will usually be able to advise on the material available.

N. H. F. STONE
Archivist

WHY MUSEUMS MATTER: AVIAN ARCHIVES IN AN AGE OF EXTINCTION

A conference organised jointly by the British Ornithologists' Club, British Ornithologists' Union, The Natural History Museum and BirdLife International, 12-14 November 1999 (see announcements in *Bull. Brit. Orn. Club* 118(3): 135-136 and *Ibis* 140(4): 723).

CALL FOR OFFERED PAPERS/POSTERS

Papers/posters relevant to the conference theme are invited. Offers, with brief abstracts, to Dr R. Prýs-Jones, Natural History Museum, Tring, Herts HP23 6AP, U.K.; fax: +44 (0) 1442 890693; e-mail: R.Prys-Jones@nhm.ac.uk

A new Scops Owl from Sangihe Island, Indonesia

by Frank R. Lambert & Pamela C. Rasmussen

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Situated between the Minahasa peninsula of Sulawesi and the Philippine island of Mindanao, the Sangihe and Talaud islands (Fig. 1) have been poorly explored ornithologically, but are now recognised as a centre of avian endemism (Stattersfield *et al.* 1998). Recent work in the Talaud islands has revealed the presence of two new species of rail (Lambert 1998a, 1998b), and on Sangihe the existence of an endemic species of shrike-thrush *Colluricincla sanghirensis* has been confirmed (Riley 1997a, Rozendaal & Lambert in press).

Four specimens of a scops owl collected on Sangihe Island (=Sangi or Great Sanghir, hereinafter "Sangihe") between 1866 and 1887 were thought not to differ from the Sulawesi Scops Owl *Otus manadensis* (Meyer 1884, Blasius 1888, Finsch 1898), and thus were never given a name. Meanwhile, from nearby Siau (Fig. 1), a single specimen obtained in 1866 was described as *Scops siaoensis* on the basis of its exceptionally small size (Schlegel 1873, Plate 4). That name was later synonymised with *manadensis* (Meyer 1884, Meyer & Wigglesworth 1898), a treatment followed uncritically by most subsequent authors. In Marshall's (1978) treatise on Asian *Otus*, no firm decision was taken on the systematic position of either *siaoensis* or the Sangihe population due to the lack of data on vocalisations. Marshall (1978) mentioned unspecified differences in colouration and tarsal feathering between *manadensis* and populations from islands off Sulawesi, including Sangihe, but he apparently examined no specimens from the Sangihe group. This led to his very tentative allocation of all these populations to the widely distributed, highly variable Moluccan Scops Owl *Otus magicus* (*sensu* Marshall 1978, Marshall & King 1988). Bruce (*in* White & Bruce 1986) thought specimens from Sangihe showed affinities with *manadensis*, but the population was nevertheless allocated (*op. cit.*) with a query to *magicus*. In 1985, F. G. Rozendaal heard an *Otus* calling on Sangihe and collected a single specimen, noting that its call was "the same whistle as heard on 'mainland' Sulawesi" (F. G. Rozendaal, *in litt.* 1998). On this basis, the Sangihe bird was placed in *manadensis* by Marshall & King (1988), who reasoned (apparently without reference to specimens or recordings) that all taxa from islands closer to Sulawesi than is Sangihe (including *siaoensis*, *mendeni* of Peleng I., and *kalidupae* of Tukangbesi Is.) should also belong with *manadensis*.

In 1996, FRL photographed a scops owl on Sangihe (Plate 5), tape-recorded its vocalisations (Fig. 2), and realised that the songs sounded different from Sulawesi birds. Subsequently, Riley (1997b; *in litt.* 1998) photographed and took a few measurements of a caged scops owl on Sangihe in poor condition and with clipped wings, but although the bird soon died it was not preserved as a specimen. Both Riley



Plate 4. Sangihe Scops Owl *Otus collari* (lower), in comparison with a Sulawesi Scops Owl *Otus manadensis* (AMNH 298939, upper left) and the unique specimen of *Otus [magicus] siaoensis* (upper right). Original watercolour painting by J. C. Anderton. Iris colour of *siaoensis* is assumed to be yellow based on colour of most related taxa.

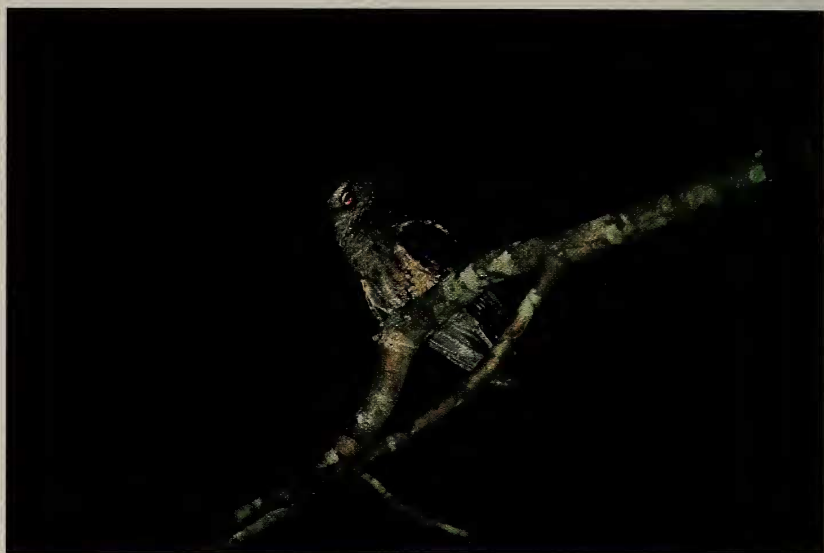


Plate 5. Photographs of a live Sangihe Scops Owl on the lower slopes of Mt. Awu near Telawid Atas, 30 July 1996 (FRL).



Figure 1. Map showing the location of Sangihe in relation to the Talaud Islands, Siau and the Minahasa peninsula of northern Sulawesi.

(1997a) and B. F. King also heard and tape-recorded scops owls on Sangihe. While scops owls heard by Riley (1997b) were said to sound "identical to birds heard and seen near Manado on mainland Sulawesi", sonagrams from Riley's tape show that they are indistinguishable from those taped by FRL. Additionally, the plumage characters reported by Riley (1997b) that were said to confirm the placement of the Sangihe bird in *manadensis* can equally be applied to some taxa of *magicus*. In 1998, PCR examined four Sangihe specimens, photographs by FRL and J. Wardill of the two above-mentioned living individuals from Sangihe, and specimens of all related taxa. Although the Sangihe bird is indeed very like some *manadensis*, several morphological differences exhibited by all specimens and photographs examined, as well as numerous striking vocal differences consistent among recordings, indicate that it is distinct at the specific level. We propose for it the name:

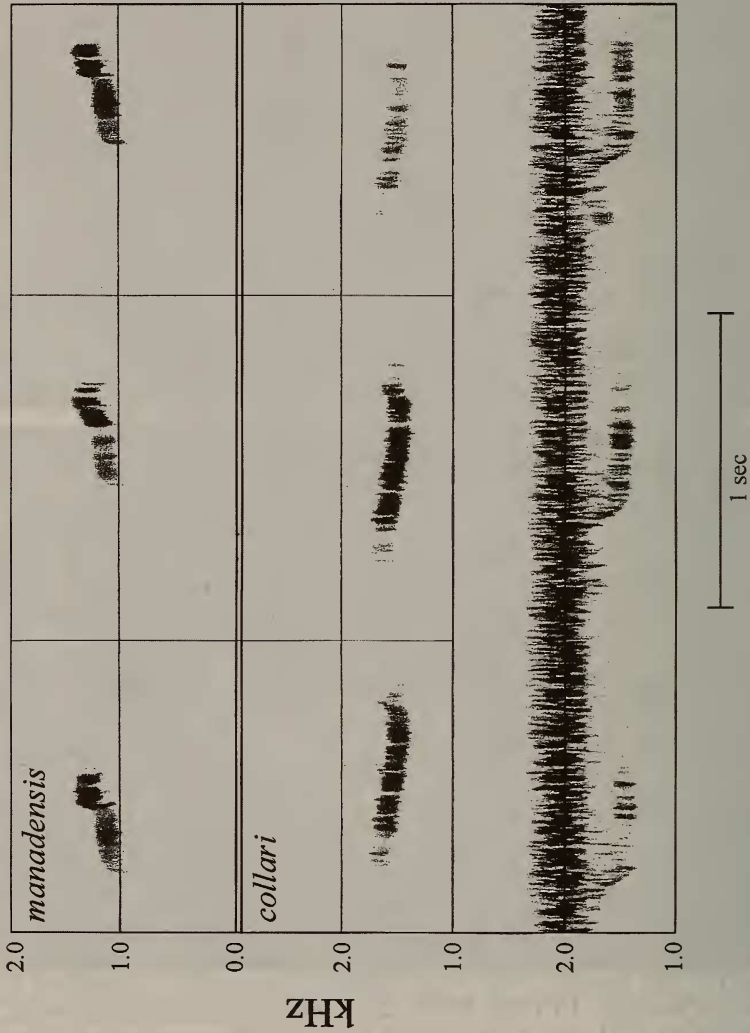


Figure 2. Sonograms of *Otus manadensis* (upper row of three phrases, intervals shortened) and *collari* (lower two rows, intervals of middle row shortened, intervals of lower recording natural). The middle row is from a recording by FRL of the bird shown in Plate 5 on 30 July 1996, while the lower recording is of a more distant bird vocalising in response to the nearby one, and the constant noise around 2 kHz is due to insects).

Sangihe Scops Owl *Otus collari*, sp. nov.

Holotype. Staatliches Naturhistorisches Museum, Braunschweig (SNMB), female, from "Sangir" (exact locality not given, but the island is centred at 3°35'N, 125°32'E), collected 2 January 1887 by Dr C. Platen, no. 6968; specimen "a" of Blasius (1888).

Diagnosis. A drab brownish, rather small, yellow-eyed scops owl with a horn-brown bill, long narrow wings, a rather long tail, and small pale feet and claws, the latter tipped darker (Plate 4). The ear tufts are medium-length with buff spots, black streaks, and elliptical tips; the pale supercilium is rather short; the face shows little contrast, the darkest part being between eye and bill; the upperparts have dark shaft streaks and are prominently spotted buff; the scapular spots are pale buff on the outer web with triangular black tips; the underparts have prominent but mostly fine black shaft-streaking and a finely vermiculated base pattern; the flight feathers are banded dark brown and buff, but the tertials are not prominently banded; the tail has narrow irregular dark buff bands and wider dark brown bands; and the tarsal feathering ends just above the tarsal joint in front and meets around the rear.

Otus collari is close to certain *Otus manadensis* (Plate 4, $n=100+$), especially to immatures, but relative to *manadensis* even from a single locality, the degree of variability among the six individuals examined of *collari* is much reduced. On the head, the facial disk of *collari* is paler and contrasts less with rest of face, there is a definite dark-banded area on the rictal bristles between eye and bill, the whitish supercilium is somewhat less obvious and ends above the bill, and the streaks on the crown are usually narrower and contrast more strongly with the paler brown base colour. On the upperparts, *collari* is slightly more coarsely vermiculated, with generally shorter, more diffuse, less obvious blackish shaft streaks, the upper wing coverts are plainer and less pale-spotted, and the scapulars have pale buffy outer webs with relatively larger triangular black tips. The underparts have a finer, sketchier background pattern with less definite, reduced cross-barring, most of it stippled rather than solid, the band interstices are drab, stippled brown, and have reduced contrast, while most of the streaks on the underparts are longer and narrower, and the pale spots on the underparts are usually smaller, buffier, more regular, and less conspicuous. The wings of *Otus collari* are longer than for *manadensis*, but they are considerably narrower due to the inner primaries being shorter and emarginations of the outer primaries being more proximal, even when corrected for size (log data divided by log wing length; Table 1), and its primaries show reduced contrast due to the pale bands being buffy and the dark bands being browner and less blackish. The tail of *collari* is slightly longer (Table 1) and the toes and claws relatively weaker than in *manadensis*. There is very limited overlap in each of these plumage and mensural characters with the extremely variable *manadensis*, (in which no more than a few of these features occur together in the same individual), and in combination they give *collari* a more uniform, drabber appearance than for adult *manadensis*.

See under "Remarks" for additional morphological distinctions from other related taxa.

Otus collari is vocally readily diagnosed by its clear, mainly downslurred, fluty, liquid, relatively high-pitched, long whistle; see under "Voice" for details.

Distribution. The new species is apparently widespread on Sangihe. In southern Sangihe, *collari* has been reported from the upper slopes of Mt. Sahendaruman (3°31'N, 125°32'E; F. G. Rozendaal, *in litt.* 1998), the southwest coast at Manganiu (3°35'N, 125°31'E, RMNH 84653) and Mt. Sahengbalira (3°31'N, 125°31'E, Riley 1997b); on the west-central coast, from near Tahuna (3°37'N, 125°29'E; Riley 1997b); and in northern Sangihe, from the northeast coast at Tabukan (=Tabukanlama, 3°41'N, 125°33'E, Meyer 1884), and from areas around Telawid, on the lower slopes of Mt. Awu (3°43'N, 125°24'E, Riley 1997a, FRL).

Description of the holotype. Colour comparisons were made under fluorescent light. Capitalised colour names and the first numbers in parentheses are from Smithe (1975); Munsell (1977) colour matches are also presented, in which the first number and letters represent the hue (but are interpretable only with reference to Munsell charts), the next increasing value or lightness, and the last increasing chroma or saturation. The holotype was directly compared with 11 *manadensis* assembled at the National Museum of Natural History, USNM, the two Leiden specimens with 25 *manadensis* at NNM, and the Dresden specimen with 19 *manadensis* at MTD; all four Sangihe specimens were compared with photographs of specimens of all taxa. For the holotype, colorimetric readings (using a Minolta CR-221 Chromameter) were taken of certain relatively solid colour plumage areas larger than 3 mm in diameter. Three sequential measurements were taken and summary statistics instrumentally calculated, then summary statistics were calculated for three independent sets of the above, with the colorimeter repositioned between each triad of measurements. Values are given in terms of the opponent colour coordinate system (L , a , b ; Graves 1997), in which higher values of L show increasing lightness (0–100), higher positive a values increasing redness (vs. greener for lower negative values), and higher positive b values increasing yellowness (vs. bluer for lower negative values), as calculated by the colorimeter. Primaries are numbered from outer to inner, so P1 is the outermost primary.

Feathers of centre of forecrown through nape with prominent pointed blackish shaft-streaks up to c. 5 mm wide, each streak bordered on both sides by spots of Pale Pinkish Buff (121D; Munsell 7.5YR 8/4), distalmost spots up to c. 3 mm in diameter, more proximal and semiconcealed spots up to c. 4 mm; streaks on hindcrown and nape narrowest. Base colour of forecrown through nape Cinnamon-Brown (33; $L=39.0 \pm 8.1$, $a=8.1 \pm 0.4$, $b=19.2 \pm 1.3$), finely vermiculated blackish overall. Supercilia short and not very conspicuous, extending only from base of ear tufts to above bill, formed of small feathers that are whitish to pale buffy on outer webs and parts of inner webs, most with black tips and/or edges. Ear tufts prominent, longest feather c. 29 mm long and c. 9 mm wide, feathers fresh, each strongly tapering

toward elliptical tip, and vermiculated Cinnamon-Brown on distal half of outer web, with a black shaft streak up to c. 3 mm wide with Pale Pinkish Buff spots up to c. 3 mm wide along the outer edge of the streak, inner web and medial portion of outer web mostly Pale Pinkish Buff ($L=53.9 \pm 2.2$, $a=6.3 \pm 0.6$, $b=23.6 \pm 0.5$). Rictal bristles up to c. 20 mm long, mainly blackish, with barred bases of Pale Pinkish Buff (bars up to c. 2 mm wide) alternating with Vandyke Brown (221) bars up to c. 2.5 mm wide; these feathers form the darkest region of the face. Feathers just above eye Raw Sienna (136; Munsell 5YR 5/6), feathers just to the rear of and below eye slightly paler, auriculars with fine, vague concentric bands, broader and darker laterally, pale bands of auriculars Pale Pinkish Buff (219) and up to c. 2 mm wide, dark bands Sepia (219; Munsell 5YR 3/2) and up to c. 1 mm wide, medial auriculars have extended distal barbs up to c. 4 mm long, while lateral auriculars mostly lack extensions. Chin and throat mostly Pale Pinkish Buff ($L=59.0 \pm 0.8$, $a=4.0 \pm 0.8$, $b=20.6 \pm 2.0$), chin slightly paler, more caudal feathers with fine Hair Brown (119A) barring and a few very small Hair Brown shaft streaks. Facial disk with incomplete, narrow, inconspicuous blackish border, heaviest at sides of throat, and bordered at rear by a poorly-defined Pale Pinkish Buff band.

Background colour and pattern of hindneck, mantle, inner scapulars, and back similar to that of forecrown (mantle colour, $L=29.3 \pm 0.3$, $a=7.4 \pm 0.2$, $b=14.0 \pm 0.3$), with a few short blackish shaft-streaks with prominent Pale Pinkish Buff spots on either side of shaft streaks (up to c. 4 mm wide); on hindneck spots more profuse and streaks smaller. Rump and uppertail coverts appear darker ($L=29.2 \pm 0.8$, $a=7.2 \pm 0.9$, $b=13.9 \pm 1.5$) due to lack of buff spots, shaft streaks are smaller and more obscure, and feathers are more distinctly barred dark. Outer scapulars have the outer webs and a smaller area on the centre of the inner web Pale Pinkish Buff ($L=53.5 \pm 1.4$, $a=3.8 \pm 0.8$, $b=19.7 \pm 1.1$) with triangular blackish tips, c. 3 mm long on smallest, uppermost pale scapular, and c. 5 mm long on largest, lowest scapular; the two largest pale scapulars also have blackish shaft streaks up to c. 1.5 mm wide.

On the lesser coverts, the vermiculated background colour appears similar to but plainer than the mantle ($L=33.6 \pm 1.9$, $a=6.8 \pm 0.2$, $b=14.9 \pm 1.1$) due to lack of large pale buff spots, but most feathers have narrow (c. 2 mm wide) Clay Color (123B; 7.5YR 7/8) bands and c. 1 mm blackish shaft streaks. The base colour of all upperwing coverts is similar (greater coverts: $L=28.9 \pm 1.0$, $a=6.2 \pm 0.3$, $b=10.6 \pm 0.6$) but the markings are progressively heavier distally, and there are large (c. 5 mm) Pale Pinkish Buff ($L=51.2 \pm 0.8$, $a=4.5 \pm 0.7$, $b=17.2 \pm 0.6$) spots to either side of the shaft streaks of the greater coverts. The tertials are relatively paler ($L=41.4 \pm 1.4$, $a=5.9 \pm 0.4$, $b=14.6 \pm 1.2$) than rest of upperparts, irregularly and vaguely banded, and heavily vermiculated.

Banding of the secondaries is more definite and regular, with most darker bands c. 5.5 mm wide and Cinnamon-Brown ($L=37.4 \pm 1.0$, $a=6.4 \pm 0.5$, $b=15.0 \pm 1.2$) and paler bands c. 2.5 mm wide and Sayal Brown (223C, Munsell 7.5YR 6/6). The banding of the upper surfaces of the primaries is better defined, most of the dark bands on the outer

webs of P3 are c. 7 mm wide and Raw Umber (223; $L=31.2 \pm 1.3$, $a=6.0 \pm 0.7$, $b=12.4 \pm 0.7$) and the pale bands (of which there are 9.5) are c. 5.5 mm wide, and darker than Pale Pinkish Buff ($L=47.2 \pm 1.9$, $a=8.9 \pm 0.2$, $b=21.4 \pm 1.0$). The bands are narrower on P1, the dark bands c. 5 mm wide ($L=26.7 \pm 3.6$, $a=6.5 \pm 0.6$, $b=11.6 \pm 1.9$), the pale bands c. 3 mm wide, and there are 8.5 pale bands on the outer web of P1. Most of the dark bands are finely outlined by narrow darker bands, the pale bands typically narrowly abut the shaft, and pale bands are vague on the inner webs. The tips of the primaries are paler, scarcely banded, and very finely vermiculated, with a dark shaft streak.

On the underwing, the secondary coverts are Pale Pinkish Buff, the proximal primary coverts vermiculated brown, and the distal primary coverts Vandyke Brown (221) with Pale Pinkish Buff distal halves, forming a distinct dark patch near the bend of the wing. The undersurfaces of the primaries are Glaucous (79; $L=37.6 \pm 0.1$, $a=3.9 \pm 0.2$, $b=9.7 \pm 0.2$) with Pale Pinkish Buff bands. The axillaries are paler than Pale Pinkish Buff, with dark brown subterminal spots c. 3 mm long.

The overall aspect of the underparts below the throat is very finely vermiculated dull brown, with the breast darker, and with prominent but mostly narrow blackish shaft streaks. The background colour of the breast is closest to Mikado Brown (121C; $L=42.9 \pm 2.9$, $a=7.7 \pm 1.1$, $b=19.8 \pm 2.4$), while the background colour of the lower underparts is distinctly paler ($L=56.5 \pm 2.4$, $a=4.7 \pm 0.4$, $b=18.7 \pm 0.8$). Each major feather of the underparts has a long dark shaft streak up to c. 3.5 mm wide but usually much narrower, two bands of Cinnamon-Drab (219C) finely outlined with blackish stippling, one terminal band up to c. 5 mm wide, separated from the other Cinnamon-Drab band (up to c. 3.5 mm wide) by a whitish band ($L=69.0 \pm 2.1$, $a=3.2 \pm 0.6$, $b=17.2 \pm 1.1$) up to c. 2.5 mm wide. More proximally, there is a wider, usually concealed whitish band, and a pale rufous band ($L=54.0 \pm 2.5$, $a=9.3 \pm 1.2$, $b=26.4 \pm 1.2$). The undertail coverts and feathers around the vent are relatively uniform and paler than Pale Pinkish Buff, each of the longer feathers with an irregular dark brownish subterminal mark.

The uppertail surface is very irregularly but rather prominently banded, with most dark bands c. 5 mm wide ($L=35.2 \pm 0.4$, $a=5.2 \pm 0.1$, $b=11.4 \pm 0.1$) and pale Tawny Olive (223D) bands c. 3 mm wide.

The tarsi are densely feathered to just above the distal joint, the feathering is complete around rear of tarsus, most being unmarked and paler than Yellow Ocher (123C; $L=62.3 \pm 1.0$, $a=5.3 \pm 0.4$, $b=26.2 \pm 0.5$), the upper side with sparse short fine dark brown streaks. The toes and claws are relatively small and weak, and the claws have pale bases and dark tips.

Specimens. 1) Holotype. 2-4) Paratypes: 2) National Museum of Natural History, Leiden (NNM), RMNH Kat. No. 16 (listed by Sharpe 1875 as *manadensis* No. 15, but this number is crossed out on the label), adult female (according to the label but a male according to Schlegel 1873), from "Sangir-Isl.", collected 10 January 1866 by C. P. Hoedt; 3) Staatliches Museum für Tierkunde, Dresden (MTD) No. C2446, adult of unknown sex, from Tabukan, collected in 1871 by A. B. Meyer, No. 8254 [although Meyer (1879) acknowledged failing

TABLE 1

Mean \pm s.d., *n* for measurements (mm) of relevant *Otus* taxa, and raw measurements for each specimen of *Otus collari* (in this order: holotype, RMNH 84653, RMNH Kat. No. 16, MTD C2446). Measurements by Blasius (1888) for holotype of *collari* and missing specimen are given in brackets. Shortfalls of each primary tip measurement from wingpoint of longest feathers (P1 S=shortfall of outermost primary, etc.) and wing notches and emarginations measured from tips of individual feathers (wing feather measurements for *staoensis* approximate due to damage). Tarsal feathering measured from tip of distalmost feather to joint of phalanges 1-2, digit three. Significant differences (two-sample *t*-test, unequal variances) of each taxon from *collari*: * = *P* ≤ 0.05; ** = *P* ≤ 0.01; *** = *P* ≤ 0.001. For primary shortfall, emargination, and notch measurements, significance tests were done on log-transformed data divided by log wing length; untransformed data are presented here. Due to small samples, significance tests were not done for *staoensis*, *mendini*, *kalidupa*, or *sulaensis*.

Variable	<i>collari</i>	<i>manadensis</i>	<i>staoensis</i>	<i>mendini</i>	<i>kalidupa</i>	<i>sulaensis</i>	<i>albiventris</i>	<i>tempestatis</i>	Moluccan <i>magus</i> ¹	Philippine taxa ²	E. Indian Ocean taxa ³
Culmen (skull)	20.1 ± 0.9, 4; 19.6, 19.3, 20.3, 21.4	20.0 ± 0.8, 53	19.9	21.2 ± 0.4, 3	23.9 ± 0.6, 0	24.6 ± 1.3, 2	21.3 ± 0.9, 24	20.7 ± 0.9, 11	25.1 ± 1.1, 75***	22.7 ± 0.9, 25**	22.8 ± 1.9, 8**
Wing length	161.2 ± 3.4, 4; 160, 166, 161, 158 [162, 160]	151.4 ± 4.4, 57**	127	146.5 ± 4.1, 3	168.0 ± 0.0, 2	167.0 ± 8.5, 2	155.9 ± 8.5, 20*	151.9 ± 4.4, 12**	175.6 ± 7.6, 78***	158.3 ± 8.6, 25	157.6 ± 9.5, 7
P1 S	38.7 ± 2.8, 4; 40.5, 38.1, 34.9, 41.2	36.50	28.2	37.4 ± 2.5, 3	38.7 ± 1.1, 2	37.4 ± 2.2, 4	35.5 ± 4.0, 19	38.7 ± 3.3, 12	39.9 ± 3.3, 47	40.4 ± 2.2, 19	36.2 ± 6.9, 6
P2 S	15.0 ± 1.7, 4; 14.7, 14.7, 13.3, 17.4	2.2, 51	14.3	14.7 ± 0.6, 3	13.2 ± 1.5, 2	14.5 ± 1.3, 2	11.6 ± 1.9, 12	13.6 ± 3.9, 9	15.4 ± 2.3, 48	14.8 ± 2.0, 19	11.8 ± 1.9, 7*
P3 S	4.7 ± 0.8, 4; 4.0, 4.4, 4.4, 5.8	3.0, 50	6.0	4.0 ± 0.4, 3	0.1, 2	0.2, 2	2.8 ± 1.2, 21*	3.9 ± 0.8, 12	4.4 ± 1.1, 50	3.3 ± 1.2, 17	2.0 ± 0.8, 7*
P4 S	0.0 ± 0.0, 4	0.2, 51	0.0	0.0 ± 0.0, 3	0.0, 2	0.0, 2	0.1 ± 0.3, 22	0.1 ± 0.3, 12	0.1 ± 0.3, 50	0.0 ± 0.0, 17	0.0 ± 0.0, 7
P5 S	3.5 ± 1.5, 3; 2.8, 5.2, -, 2.4	1.1, 45	-	0.2 ± 1.3, 3	1.3 ± 0.3, 2	1.3 ± 0.1, 2	0.7 ± 1.0, 19	0.5 ± 0.7, 11*	1.4 ± 1.2, 47	1.9 ± 1.7, 14	3.1 ± 0.9, 7
P6 S	10.0 ± 1.2, 4; 9.1, 10.8, 11.3, 8.8	7.5 ± 1.6, 42**	8.5	5.0 ± 0.1, 3	6.9 ± 1.7, 2	6.3 ± 1.7, 2	6.7 ± 1.6, 11**	6.6 ± 1.6, 11**	6.7 ± 1.6, 41***	7.7 ± 2.5, 14*	11.6 ± 1.7, 7
P7 S	18.9 ± 1.7, 4; 17.3, 20.9, 19.7, 17.7	20, 43**	15.1	11.9 ± 1.4, 3	14.1 ± 2.0, 2	14.7 ± 1.4, 3	14.8 ± 2.2, 18**	14.1 ± 1.8, 12***	14.0 ± 2.2, 39***	14.0 ± 2.4, 14**	19.9 ± 1.4, 7
P8 S	27.7 ± 1.6, 4; 26.7, 28.2, 29.7, 26.2	2.4, 41**	20.3	18.8 ± 0.7, 3	21.8 ± 2.7, 2	21.4 ± 2.1, 4	22.1 ± 3.0, 16**	22.3 ± 2.0, 12***	22.3 ± 2.2, 40***	21.3 ± 2.7, 14***	26.3 ± 2.7, 6
P9 S	34.0 ± 1.8, 4; 32.8, 34.3, 37.0, 33.6	2.5, 40**	27.3	24.3 ± 1.6, 3	28.0 ± 3.8, 2	29.0 ± 3.4, 2	29.1 ± 3.0, 16***	30.1 ± 2.6, 39***	29.6 ± 36.8 ± 37.1 ±	28.9 ± 24.13***	32.1 ± 3.4, 6
P10 S	41.0 ± 1.6, 4; 39.6, 41.5, 43.0, 39.7	4.3, 52*	36.9	29.9 ± 0.6, 3	33.2 ± 8.6, 8	34.2 ± 8.1, 3	35.8 ± 75.4 ± 70.2 ±	35.9 ± 70.2 ± 3.8, 12*	36.8 ± 86.1 ± 73.2 ±	37.1 ± 7.3, 16	39.8 ± 2.8, 4
P1 length	76.2 ± 7.10, 4; 76.0, 78.5, 70.8 ± 4.3, 52*	54.1 ± 3.7, 54***	60.9	66.8 ± 4.6, 3	86.8 ± 58.4 ± 50.0 ±	81.3 ± 1.8, 2	75.4 ± 55.3 ± 4.0, 21***	70.2 ± 55.4 ± 3.8, 11	86.1 ± 59.6 ± 4.0, 54***	73.2 ± 54.6 ± 4.9, 7	76.2 ± 54.7 ± 4.9, 7
P2 emargination	59.3 ± 1.3, 4; 58.7, 60.4, 60.5, 57.8	49.5 ± 3.4, 52	-	5.0, 3	4.7, 2	1.8, 2	4.2, 21***	48.6 ± 55.2 ± 49.1 ±	55.2 ± 55.2 ± 49.1 ±	49.1 ± 41.5 ± 49.4 ±	49.4 ± 49.4 ± 49.4 ±
P3 emargination	56.3 ± 4.0, 3; 52.5, 56.0, -, 60.5	3.4, 52	-	3.2, 3	5.7, 2	0.1, 2	3.1, 20	3.7, 12	3.1, 58	2.2, 15	6.6, 7
P3 notch	46.5 ± 1.5, 3; 47.8, 44.8, 46.8, -	2.6, 32	-	37.9 ± 2.6, 3	41.0 ± 2.4, 2	55.1 ± 0.1, 2	40.2 ± 2.4, 19*	38.8 ± 3.2, 40*	42.6 ± 3.2, 40*	41.5 ± 2.4, 14	4.0, 5**
Tail length	74.2 ± 3.2, 4; 78.0, 74.6, 74.1, 70.1 [79, 72]	3.5, 51*	57.1	65.0 ± 1.3, 3	0.4, 2	2.0, 2	72.9 ± 3.6, 24	74.3 ± 2.8, 12	84.1 ± 4.3, 71**	75.9 ± 3.9, 25	72.0 ± 8.4, 7
Tarsus length	47.4 ± 0.4, 3; 27.7, 27.6, 26.9, -, [26, 26]	27.0 ± 1.2, 54	26.8	26.7 ± 1.2, 3	33.2 ± 0.0, 2	29.1 ± 0.7, 2	28.2 ± 1.5, 23	27.5 ± 1.6, 12	33.2 ± 1.8, 75***	32.5 ± 2.8, 23***	27.5 ± 2.3, 8
Tarsal feathering	3.7 ± 0.6, 3; 3.0, 3.8, -, 4.3	5.4, 31*	4.5	14.9 ± 1.4, 3	1.8, 2	1.8, 2	5.2 ± 1.3, 25*	4.7 ± 1.3, 12	9.9 ± 3.4, 72***	6.5 ± 1.5, 15***	7.5 ± 2.3, 8

¹*Otus magicus magicus* (*n*=24), *bovrensis* (*n*=9), *obira* (*n*=1), *leucophilus* (*n*=24) and *marotensis* (*n*=21).
²*Otus mantanensis capensis* (*n*=3), *sibaticensis* (*n*=15, including *stereis*), *rombionis* (*n*=5) and *mantanensis* (*n*=2).
³*Otus enganensis* (*n*=4), *altus* (*n*=2), and *tambra* (*n*=2) combined due to small sample sizes.

to properly label some specimens collected on the trip on which this specimen was collected, MTD C2446 closely matches the other Sangihe specimens in plumage and measurements]; 4) RMNH No. 84653, adult male, from Manganitu, collected 22 May 1985 by F. G. and C. M. Rozendaal, skull completely ossified, weight 76 g.

Another female specimen collected on Sangihe by Platen on 24 January 1887 (specimen "b" of Blasius 1888) is no longer in the collection of the Staatliches Naturhistorisches Museum, Braunschweig, and is presumed to have been lost near the end of World War II (G. Boenigk, *in litt.* 1998). Since measurements given for the holotype (specimen "a") by Blasius (1888) are very similar to those obtained by PCR for the same specimen, it is assumed here that Blasius's measurements of the missing specimen "b" are comparable, and thus they are presented in Table 1, but they were not used in the summary statistics or analyses. The missing specimen was said to be redder and darker overall than the holotype (Blasius 1888).

Measurements of the holotype (lengths in mm). Wing (flattened and straightened) 160; tail 78.0; tarsus 27.7; bill (from skull) 19.6; bill (from anterior edge of cere) 12.8. For additional measurements of holotype and those of paratypes and related species, see Table 1.

Soft-part colours. For the holotype and Platen's specimen "b" (Blasius 1888), the iris was "hell-gelb" (light yellow), and the bill and feet "braun" (brown). RMNH 84653 had "eyes bright yellow; bill horn; legs horn". An individual tape-recorded and photographed at night (with a flash) by FRL (Plate 5) showed pale yellow irides and a narrow dark rim around the eye, visible part of bill brownish-horn with a blackish tip, pale brownish toes, and pale-based, dark-tipped claws. The live specimen photographed by J. Wardill had a brownish-horn bill, greyish uppersurfaces to toes, soles of toes pale pinkish, and claws with pale bases and dark tips, but its eyes were closed in the photographs we have examined.

Voice. Among related taxa for which vocalisations are known, the voice of *collari* resembles only that of *manadensis*, in that both are whistled. However, the quality, form, pitch, duration, and rhythm all differ greatly between the two. The songs of *manadensis* have been documented from various parts of Sulawesi. The typical song of *manadensis* is a breathy, oft-repeated whistle of two short staccato, syncopated elements, "ploe-ek—ploe-ek" or "oe-ek—oe-ek" (Coomans de Ruiter & Maurenbrecher 1948; Fig. 2), also rendered as "tona-as", "hooit", and "dojot" (Coomans de Ruiter 1950). Each phrase, which falls between c. 1–1.5 kHz, is c. 0.4 sec in duration, commences at the lowest frequency, has a distinct frequency shift at the start of the second element with no decrease in amplitude, and terminates abruptly at the highest frequency. Other songs or calls reported for *manadensis* include a clear "kête" or "kiek", sometimes changing into a rapid "kok, kok, kok" or "kiek, kiek, kiek" of increasing amplitude but steady frequency. Alternating series of song or call types may also be given, "oe-ek-oe-ek-oe-ek . . . oi, oi, oi, oi, oi . . ." (Coomans de Ruiter & Maurenbrecher 1948, Coomans de Ruiter 1959).

In contrast, the vocalisations of *collari* are strikingly different. Its whistled song (Fig. 2) is longer, higher-pitched, much sweeter, clearer, more modulated, and slurred. Each phrase is of c. 0.7 sec duration, consists of only one perceptible element, and falls between c. 1.65–1.85 kHz. A descending “kleeeer”, it commences at the highest frequency, is downslurred for most of its duration, and is at maximum amplitude during the middle two-thirds of the element. In a tape-recorded sequence of 11 very similar “kleeeer” phrases (Fig. 2; FRL), the intervals between phrases ranged from c. 8–15 sec, mean 11.2 ± 2.2 sec, $n=9$ intervals (one interval of 28 sec was not included in this computation because a more distant bird was calling; Fig. 2, lower).

The latter song type (Fig. 2, lower) sounds three-noted because each phrase is much more variable in pitch. These phrases, which are separated from one another by only c. 0.3 sec, commence at c. 1.8 kHz, increase in frequency to c. 2.0 kHz, and then abruptly decrease to c. 1.75 kHz, remaining at that frequency for the duration. They are of the same sweet, liquid quality as the single-noted “kleeeer” song.

In another, more distant sequence (recording by J. Riley, NSA: wa1997/54:4b; 2010 h, 18 November 1996, Sahengbalira), six near-identical “kleeeer” notes were given in 53 sec, each commencing at its highest pitch and being slightly downslurred (frequency range 1.6–1.8 kHz). The intervals between phrases ranged from c. 9–11 sec, mean 9.4 ± 0.9 sec, $n=5$ intervals, and each phrase was c. 0.8 sec in duration. Thus, Riley’s tape-recorded sequence does not support his (1997b) contention that vocalisations of Sangihe birds are like those of *manadensis*, but instead it is very like the tape-recording made by FRL, and we know of no approach between any of the calls of the two species.

Etymology. This species is named after our friend and colleague Dr Nigel J. Collar in recognition of his numerous contributions to the important field of bird conservation. His work has stimulated enormous interest in threatened birds, and has encouraged a conservation ethic and philosophy amongst a generation of amateur and professional ornithologists and birdwatchers.

Remarks

Differences between Otus collari and other taxa in manadensis superspecies

Geographically distant and morphologically distinct taxa considered separate species by Rasmussen (1998: Seychelles Scops Owl *Otus insularis* and Biak Scops Owl *O. beccarii*) and those from islands off Africa are excluded from the following comparisons, as are the clearly different taxa of Elegant Scops Owl *Otus elegans*. The present taxonomic placement of certain other taxa is dubious, and work in progress is targeted toward resolving these problems, in particular the status of *siaoensis* (Rasmussen & Lambert, unpubl. data).

East Indian Ocean taxa

From the three “East Indian Ocean” island endemics as a group (including Simeulue Scops Owl *O. umbra*, $n=2$ adult specimens

examined; Enggano Scops Owl *O. enganensis*, $n=4$; and Nicobar Scops Owl *O. alius*, $n=2$, Rasmussen 1998; but excluding the Mentawai Scops Owl *Otus mentawi*), *collari* differs in being more streaked overall, having longer eartufts, a more prominent facial disk, and more spotted upperparts. However, *collari* and *siaoensis* are the only Wallacean taxa of this superspecies with such narrow wings as the East Indian Ocean group, but both of the former taxa differ from the latter group in that the second and third primaries (from outermost) are shorter, which gives them more pointed wingtips (Table 1). Additionally, *collari* differs from *alius* (see plate in Rasmussen 1998) in that its supercilium is whiter and more prominent, in overall plumage it is much more heavily streaked, with spotting rather than barring above, its pale scapular spots are larger with triangular black tips, its tarsi are feathered more distally, and its feet and claws are smaller. From *enganensis*, *collari* differs in its smaller size, especially its bill, feet and claws, in lacking long extensions of the distal barbs of the rear auriculars, in having larger, blacker scapular tips, and in being much less uniform and less rufous overall. From *umbra*, *collari* differs in its much longer wings and tail and much less uniform, less rufous overall plumage.

Taxa from outlying islands in Sulawesi region

Otus [m.] siaoensis, despite its provenance, differs more strongly from *manadensis* and *collari* than the latter two do from each other (Plate 4, Table 1). Nevertheless, *siaoensis* and *collari* appear to share a pattern of shortfalls of primaries from the wingpoint that differs from that of all the Moluccan and Lesser Sundas taxa of *magicus*, as well as *manadensis*, the following three taxa from islands to the east of Sulawesi, and the more distantly related *beccarii* and *insularis* (Rasmussen 1998). The apparent similarity in wing shape notwithstanding, *collari* differs greatly from *siaoensis* in numerous characters. The former has much longer wings and tail, although the bill, feet and claws are of approximately the same size, its eartufts are longer, less full and more pointed, its throat is more heavily marked and less conspicuously pale, it lacks a prominent pale nuchal collar, its underparts pattern is much more vermiculated, more regularly barred, and drabber in colour, with the black shaft-streaking greatly predominating over the barring, its remiges and rectrices have fewer bands, which are outlined on both edges by narrow blackish bands, and its tail is much more broadly, irregularly, and less strongly banded.

Compared to *Otus [m.] sulaensis* (Finsch 1898, King 1997; Sula Islands, east of Sulawesi, $n=2$ adults, entire world holdings), *collari* is smaller, less heavily marked, and paler overall (Table 1). Its auriculars are paler, its eartufts blotchier and unbarred, its upperparts more broadly streaked, its scapular spots lack large blackish blotches, the pale bands in its primaries are larger and extend to the shaft and to some extent the inner web, its tail is more prominently banded, and its tarsi are much more extensively feathered, especially on the rear (plantar) surface.

Otus collari differs from *O. [m.] kalidupae* (Tukangbesi, south-east of Sulawesi, $n=2$ adults, entire world holdings) in being smaller, darker, and browner overall (Table 1). Its eartufts are also much more heavily

marked, its scapular spots have large black terminal triangles and lack fine black transverse lines, its underparts have more distinct, finer barring, the upper surfaces of its outer primaries have much wider and more uniformly dark bands, but the undersides of the inner webs of the primaries have less prominent pale barring, and its tertials and upper tail surface are more prominently banded.

From *O. [m.] mendeni* (Peleng Island, off eastern Sulawesi, $n=3$ adults, entire world holdings), *collari* differs greatly in its much longer wing and tail. Additionally, its ear tufts are more heavily streaked and spotted, it has a paler bill, the darkest area of its face is between the bill and eyes, its upperparts have much broader streaks and larger pale spots, its overall plumage is much more uniformly brown, the streaking on its underparts is narrower, less blotchy, and lacks rufous areas around the black shaft streaks, its scapular spots have larger pale areas (rather than having black central cross-lines) and larger triangular black tips, its tertials are more prominently banded, and its tarsus is feathered much more distally.

Otus magicus

Compared to *O. magicus albiventris* and *O. m. tempestatis*, the small Lesser Sundas (Nusa Tenggara) subspecies of *Otus magicus*, *collari* differs in that the auriculars and area around the eye do not form a distinct dark patch, its white supercilium does not extend to the front of the face, its bill is browner, its upperparts are more twin-spotted, its lower underparts have smaller, less conspicuous white markings, its primaries have broader dark bands, its tertials are less prominently and less evenly banded, and its tail is much more broadly but less distinctly dark-banded. *Otus collari* also differs from *albiventris* in that its ear tufts are shorter, less pointed, more blotched, and have buffier bases, and its underparts are more finely vermiculated with fewer heavy black streaks. Additionally, *collari* differs from *tempestatis* in that its pale scapular spots have larger black triangular tips and lack narrow blackish cross marks. The five Moluccan forms of *Otus magicus* (Table 1) are all considerably larger than *collari*, and none closely resemble it in plumage.

Philippine taxa

To the north of Sangihe, the nearest related taxa are four disjunct Philippine races of Mantanani Scops Owl *O. mantananensis*: *O. m. cuyensis* (Cuyo I., west-central Philippines, $n=3$); *O. m. romblonis* (Romblon, Sibuyan, and nearby islets, $n=5$); *O. m. sibuensis* [(including *steerei*, type examined), Sibutu and Tumindao, Sulu Archipelago, $n=15$]; and *O. m. mantananensis* (islets between Borneo and Palawan, $n=2$). Compared to all these taxa (combined), *collari* is smaller, especially its bill and feet, although its wings are longer and narrower (Table 1), the lower edge of its throat is less streaked, its facial disk is less distinct, and its tarsi are more extensively feathered. Additional differences exist between *collari* and each race of *mantananensis*.